Sheet (3)

Analysis of Batch Production

No. 1

The production of an article involved machine setup and preparation costs amounting to L.E. 12,000. The constant costs for each article were :

Material Costs	L.E.	0.15
Labour Costs	L.E.	0.04
Overheads	L.E.	0.06

The interest paid on the capital was 12 percent. The time taken on the first operation was 8 m.m. While the time required for all operation was 100 m.m. The volume of the article is given as 0.01 Cu.ft., and the rate of consumption was uniform at 20 per day. It was decided to divide the produced batch into three lots, each of which is finished before the subsequent batch is started. Assume that the setup do not increase appreciately by the division of the batches into lots. Compare the minimum cost batch sizes obtained by the use of the typical formula and camp and Reymond formulas, when the rate of production is given a :

i- 500 per day

ii- 200 per day

iii- 80 per day

and when for each of these cases the storage charge is :

a- 0.001 L.E. per Cu.ft. per day

b- 0.003 L.E. per Cu.ft. per day.

No. 2

Demonstrate the effect of variables in the above example namely the rate of production and the storage charge on the results by plotting the batch size against when

b = 0.001 L.E. per cu. ft. per day and against b when .

a_p = 200 units per day

Find the total costs per piece according to the three formulae for the case when b = 0.001 L.E. per Cu. ft. per day and when a_p = 200 per day.

(Note : Assume there are 300 working days in a year.)

No. 3

In connection with batch production, the following data is known:

Preparation Costs	L.E.	1500	
Rate of production		2000	per day
Rate of consumption		500	per day
Storage Charges	L.E.	3.0	per piece per annum
Materials, labour and overheads cost	L.E.	2.0	
Rate of interest		9%	per annum

No. 4

Find the effect of splitting the batch into lots (up to 10 in number) by using the Reymonds's formula. Plot batch size against number of lots and compare the results with the typical formula.

Assume:

$$k = 0.6$$

$$A = 1 + 0.05\,(N - 1)$$

The set up costs will increase with the number of lots introduced, being L.E 1400 + 100 N.

1- Find the total cost per piece when Q_m is produced.

2- Find the rate of return (for N = 1)

3- Calculate the cost of the production run.

No. 5

In the problem (3) the sales price is 20 percent above the minimum costs per piece.

1- Find the economic batch size (for N = 1) .

2- Calculate the production costs per piece.

3- Find the rate of return.

4- Find the cost of the production run? Compare these results with those obtained in problem (3).

No. 6

The constant costs per piece is known to be L.E. 4.00, the carrying charges factor $k = 0.5 \times 10^{-3}$ L.E. per unit per day and the set up costs per batch are L.E. 10,000. Find the production range if the allowable increase in total costs per piece is 2 percent above the minimum costs per piece . What is the economic production range if the sales price is fixed at 16 percent above the minimum costs per piece.